REMARKS

The Reply is responsive to the Final Office Action mailed February 24, 2006 and is accompanied by a petition for a One-month extension of time along with an authorization to charge the same. In this Reply, claim 1 has been amended and claim 7 has been canceled. No new matter has been added.

All pending claims (1-9 and 11) were rejected based on newly cited references Pyo (US 6,593,236), Aoki (US 5,676,760), and Pyo, Sung Gyu (US 2002-0006727). Pyo and Pyo, Sung Gyu are actually substantively the same reference. Claims 1-9 and 11 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-23 of U.S. Patent No. 6,821,309. Although Applicant respectfully disagrees with the double patenting rejection, to expedite prosecution Applicant has provided an executed terminal disclaimer to overcome the double patenting rejection.

In the Reply, claim 1 has been amended to recite the limitation that had been recited in dependent claim 7 drawn to slurry particles, specifically " particles comprising silica, alumina, titania, yttria, zirconia, zinc oxide, porous silica, or alumina cores or silica cores coated with alumina, yttria, titania, or a polymer". Accordingly, no new matter has been added, nor is a new search required.

Applicant notes that although claim 7 (reciting slurry particles) and claim 8 (reciting a surfactant) were rejected in the Final Office Action, no basis for the rejection of these claims was provided in the action. As Applicant's counsel, the undersigned, noted during the June 8, 2006 teleconference with the Examiner, particles are an important part of chemical mechanical polishing (CMP), the focus of the present invention. CMP is commonly used in semiconductor fabrication, such as for removing copper. In CMP, the removal process proceeds based on both

chemical and mechanical action (polishing pad pressure on slurry particles applied to surface to be polished). As described below, the cited art has no connection to CMP.

Pyo/ Pyo, Sung Gyu is entitled "Method of forming a metal wiring in a semiconductor device with copper seed" and discloses a method of forming a metal wiring in a semiconductor device. A copper wiring is formed by means of CECVD method by which a *chemical enhancer layer* is utilized for increasing the deposition speed of copper. The damascene pattern is filled by means of MOCVD method using a copper precursor in order to increase the deposition speed. The chemical enhancer layer rises to the surface of copper after deposition of copper by a CECVD method and then the relatively high resistivity chemical enhancer layer that has risen to the surface of copper by plasma process is removed. Therefore, the ultra-fine damascene pattern can be rapidly filled with copper without increasing the resistance of the copper wiring. Although the chemistry used to form the chemical enhancer layer is similar to that recited by Applicant, Pyo does not mention particles, or relate at all to slurries or CMP.

Aoki is entitled "Method for wet processing of a semiconductor substrate". Aoki discloses electrolyzed waters, including an anode water and a cathode water, having either oxidizing or reducing activity and having either acidity or alkalescency, which is obtained by electrolysis of an aqueous solution prepared by addition of a minute amount of electrolytes, is applied wet processings including cleaning, etching and rinsing processings of semiconductor wafers. The effects of the electrolyzed waters are not lower than those the conventional acidic or alkalic chemicals provide, and reduces quantity of chemicals used in wet processings in semiconductor manufacturing. Aoki, like Pyo, does not relate at all to slurries or CMP.

Unlike Pyo, the word "particle(s)" is mentioned in Aoki. However, particles are disclosed in the context of removal of particles (i.e. cleaning) which are on a semiconductor

substrate. For example. col. 9, line 54 to col. 10, line 13 disclose the particle *removal* aspect of the Aoki invention:

A cathode water having a slow etch-rate range is applicable to removing inorganic particles residual on a silicon substrate. For example, an embodiment applied to removing colloidal silica adhered onto a Si substrate which has been subjected to CMP (chemi-mechanical polishing) will be described below. FIG. 6 shows a cleaning effect attained by a ten minute overflowing of a cathode water having -720 mV and 8.2 in ORP and pH values, which has been prepared by electrolysis of an electrolytic solution including ammonium chloride at concentration of 5.times.10.sup.-5 mol/l, in comparison with a conventional method using an APM solution. The result indicates that colloidal silica remained at more than 2000 particles/wafer prior to treatment reduced down to 80 particles/wafer. It is an excellent result as compared to the result of 100 particles/wafer which is attained by the conventional APM solution. Hence, employment of cathode water reduced concentration of chemicals and improved operational safety. Cathode waters having ORP values less than -700 mV and pH values more than 8 are especially effective for removing those inorganic particles. Electrolyzed waters obtained from solutions including ammonium chloride or ammonium acetate only at a rate of 2.times.10.sup.-5 mol/l have also enough effective. This cathode water treatment is employed to remove particles by a minute amount of etching a silicon surface. Simultaneously, the cathode water exhibited an advantage that particles are difficult of re-adhesion onto the silicon substrate surface in the cathode water.

In the second paragraph of Aoki's "Description of the Related Art (copied below), CMP is mentioned:

There exist many so-called wet processing steps for manufacturing semiconductor devices, such as cleaning, etching and rinsing. Even if confined to steps conducted by semiconductor substrate manufacturers, after a step for pulling-up single crystals, the wet processes extend to cleaning processes. These include slicing, mechanical lapping and chemi-mechanical polishing steps by employing organic chemicals, a cleaning process for removing sludges generated in the mechanical lapping step, etching processes employing strong acids and alkalis, and chemi-mechanical polishing process; which consumes vast volume of chemicals.

However, this mention of CMP in Aoki is only noting the CMP process consumes vast amounts of chemicals, as compared later to the Aoki invention (unrelated to CMP) which consumes far less amounts of chemicals. As noted above, the Aoki invention is unrelated to CMP.

Applicant's claimed CMP slurry includes both chemicals and slurry particles which provide the mechanical action required for CMP. In contrast, processes which rely exclusively

on chemical action include only chemical agents, such as the art cited by the Examiner. Accordingly, slurry particles are not contemplated in the cites art. Accordingly, amended claim 1 and its respective dependent claims are believed to be clearly patentable over the cited art.

As noted above, claim 8 recites the slurry "further comprising at least one surfactant". This features is not disclosed or suggested in the cited art and thus is believed to provide a separate basis for patentability.

Applicant have made every effort to present claims which distinguish over the cited art, and it is believed that all claims are now in condition for allowance. However, Applicant requests that the Examiner call the undersigned if anything further is required by the Examiner prior to issuance of a Notice of Allowance for all claims.

No fee is believed due related to the filing of this amendment other than the one-month extension of time. However, if any fee is due, the Commissioner is authorized to charge any such fee and any additional fees due or credit any overpayment to Deposit Account No. 50-0951.

Respectfully submitted,

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